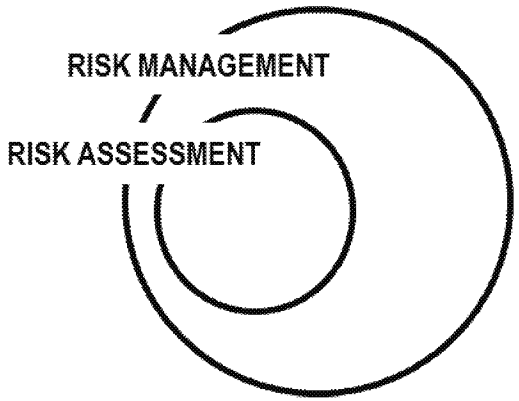
If You Were the EPA Administrator



Presentation to ORD Post-Docs
11 April 2017

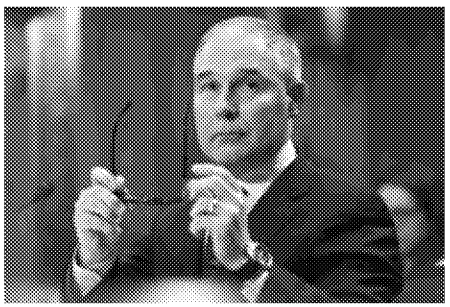
Kevin Teichman, Ph.D.
U.S. Environmental Protection Agency

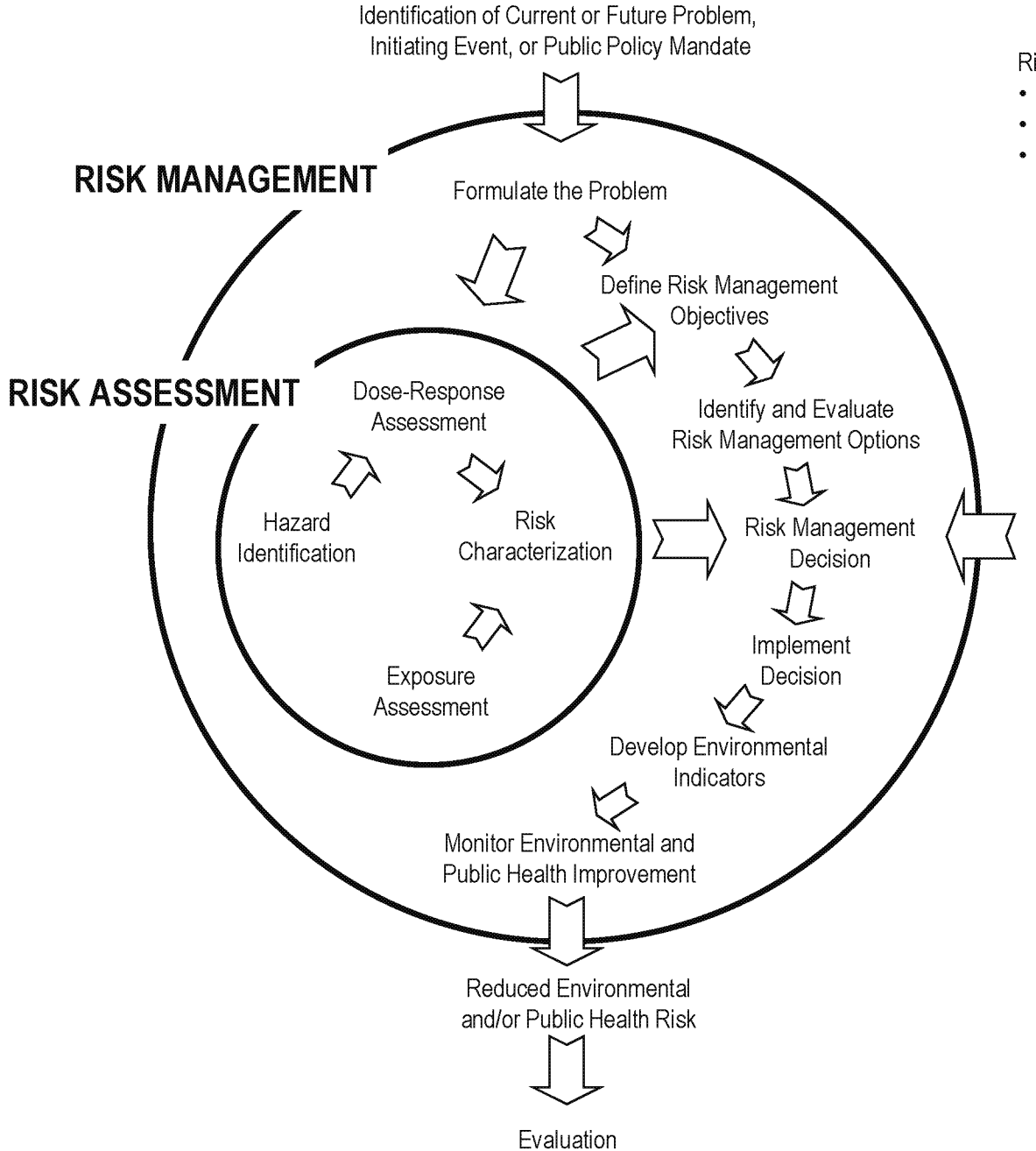
Disclaimer

The views expressed are those of the presenter and do not necessarily reflect those of the U.S. Environmental Protection Agency.

In addition, the mention of any trade names or products does not imply either endorsement or that the materials or products identified are necessarily the best available for the purpose.

EPA Decision Making





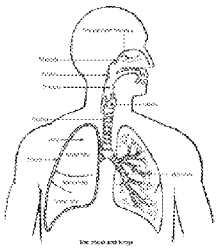
Risk Management Options

- Prescriptive standards
- Performance-based standards
- Non-regulatory approaches
  - Action levels, health advisories
  - Labelling
  - Consumer and other information
  - Voluntary consensus standards
  - Industry recommended practices
  - Third-party certification

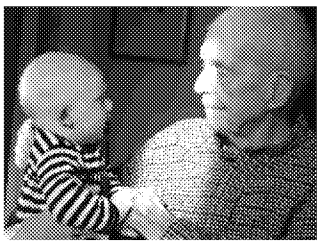
- Statutory and Legal Considerations
- Public Health Considerations
- Environmental Considerations
- Social Factors
- Economic Factors
- Policy Considerations
- Political Considerations

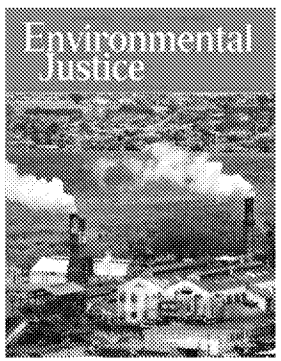
Risk Assessment Considerations

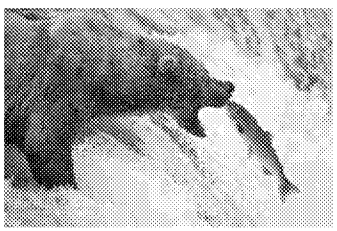
Exposure x Dose-Response = Risk



- Cancer and non-cancer hazards
- Acute and chronic exposures
- Occupational and public health
- General and susceptible populations
  - Examples of susceptible populations: children, elderly, asthmatics, highly exposed, hypersensitive
- Ecological and Health Risks

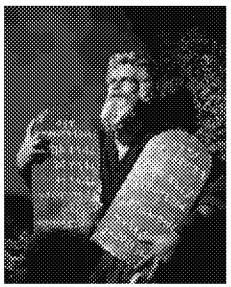


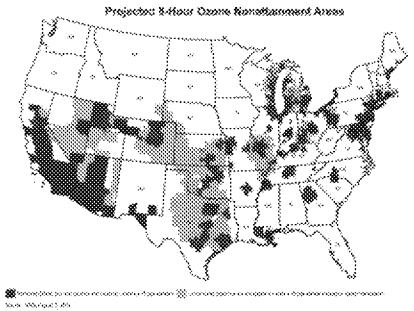


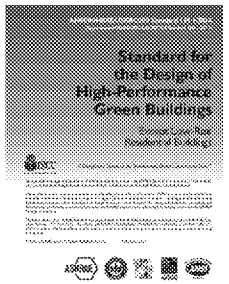


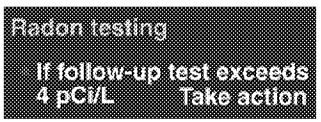
Risk Management Options

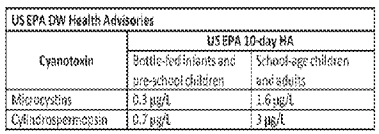
- Prescriptive standards
- Performance-based standards

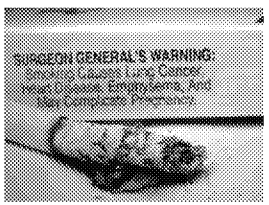


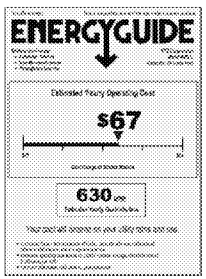


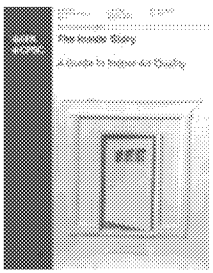


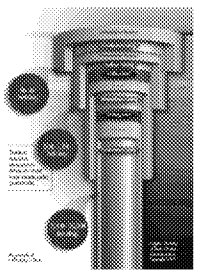












Non-regulatory approaches

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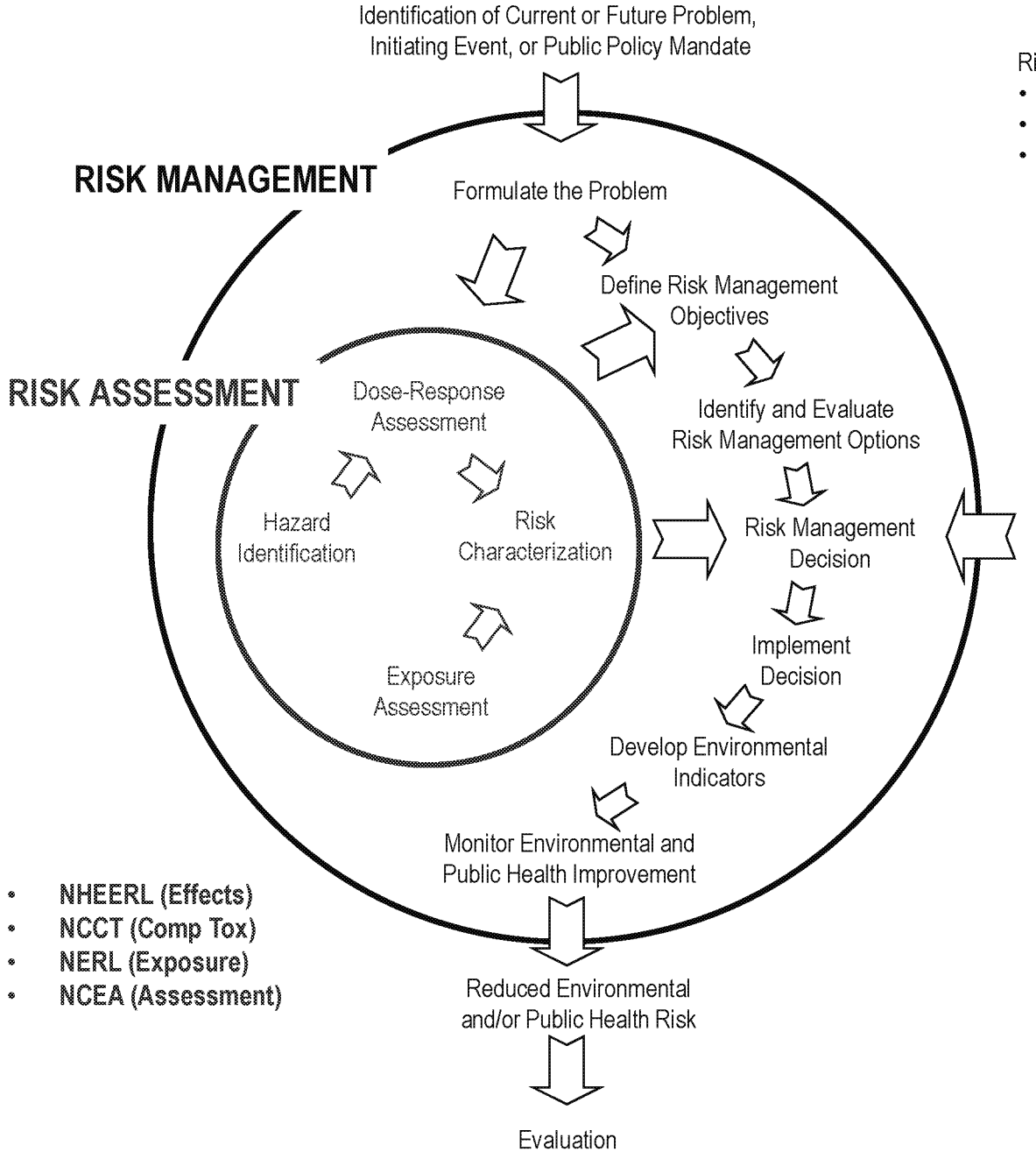

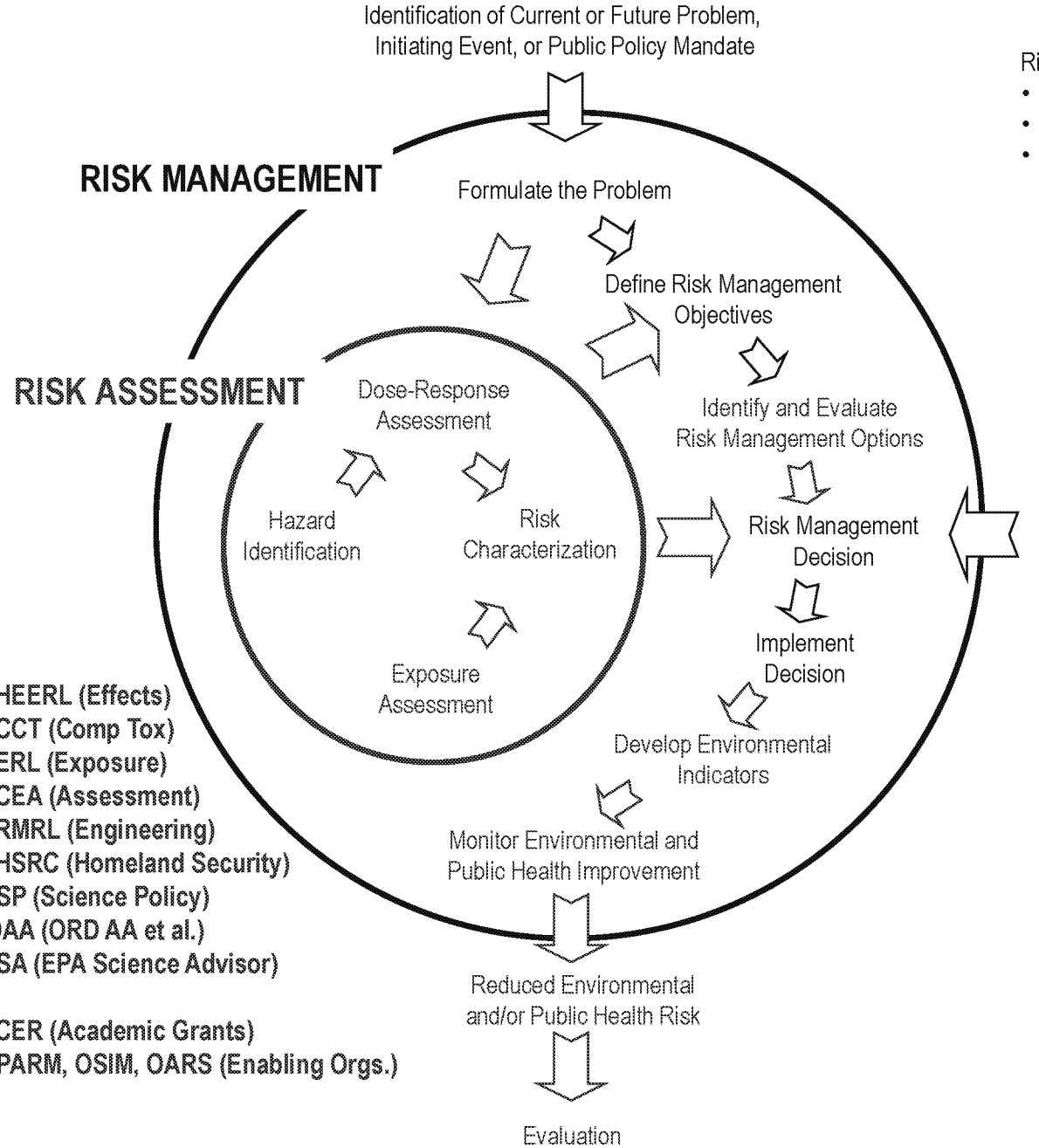

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- **NHEERL (Effects)**
- **NCCT (Comp Tox)**
- **NERL (Exposure)**
- **NCEA (Assessment)**
- **NRMRL (Engineering)**
- **NHSRC (Homeland Security)**
- **OSP (Science Policy)**
- **IOAA (ORD AA et al.)**
- **OSA (EPA Science Advisor)**

- **NCER (Academic Grants)**
- **OPARM, OSIM, OARS (Enabling Orgs.)**

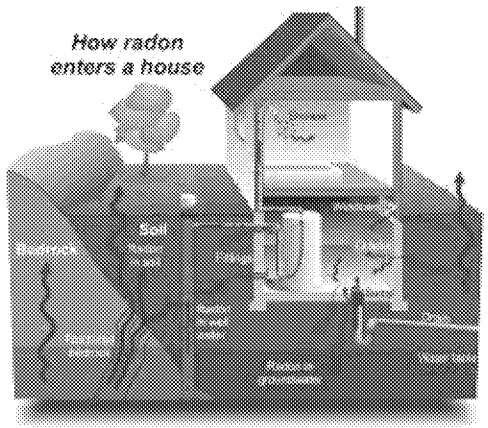
Example Case Studies

- Environmental Tobacco Smoke
- Radon
- Particulate Matter
- Lead in Drinking Water

Environmental Tobacco Smoke

- "Smoking and Health: Report of the Advisory Committee of the Surgeon General of the Public Health Service" (1964)
- "The Health Consequences of Involuntary Smoking: A Report of the Surgeon General" (1986)
- EPA's Risk Assessment, "Respiratory Health Effects of Passive Smoking" concluded that environmental tobacco smoke is causally associated with lung cancer in adults and designated ETS as a known human carcinogen (1992).
- Executive Order 13058, "Protecting Federal Employees and the Public from Exposure to Tobacco Smoke in the Federal Workplace" (1997)

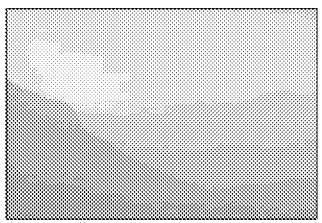
Radon



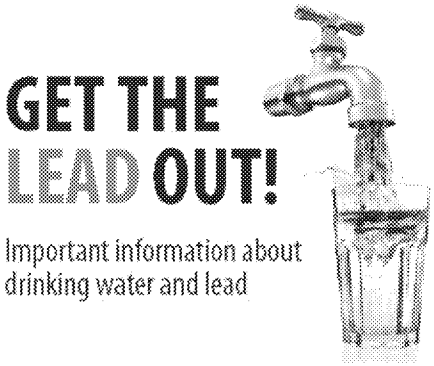
- A nuclear power plant employee triggered a radiation detector as he walked *into* work at the Limerick, PA nuclear power plant (1984).
- EPA publication "A Citizen's Guide to Radon: What It Is and What To Do About It" (1986)
- "Indoor Radon: Exploring U.S. Federal Policy for Controlling Human Exposures" (Nazaroff and Teichman, ES&T, June 1990)
- Revised Citizen's Guide: "If you smoke and your home has high radon levels, your risk of lung cancer is especially high." (2012)

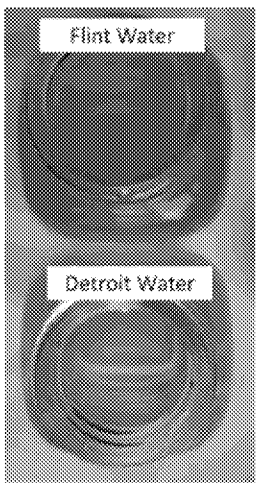
Particulate Matter

- Particulate matter (PM) is one of six national ambient air quality pollutants identified in the Clean Air Act.
- Over time, the standard has regulated smaller particles: Total Suspended Particles (1971), PM_{10} (1987), $PM_{2.5}$ and PM_{10} (1997, 2006, 2012).
  - Finer particles (PM_1)?
  - Ultrafine particles ($PM_{0.1}$)?
- Avoided health effects include, but are not limited to, premature adult mortality, respiratory symptoms in asthmatics, hospital admissions (asthma, non-fatal heart attacks), lost work days.
- PM NAAQS Benefit/Cost ratio: 10-171 : 1
  - Costs: $44 M - $290 M per year
  - Benefits: $2,980 M - $7532 M per year



Lead (Pb) in Drinking Water





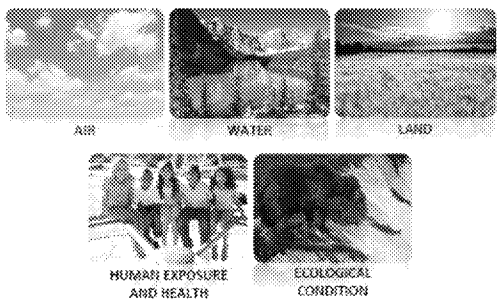
- Pb exposure in young children has been linked to learning disabilities, and children with blood lead concentrations greater than 10 µg/dL are in danger of developmental disabilities.

  Pb can be found in air, water, soil, and paint (pre-1978).
  - Lead can occur in drinking water as a result of corrosion of plumbing materials, such as lead pipes, fixtures and solder.
  - Pb-Cu (LCR) rule sets a 15 ppb limit for lead measured at customer taps; if 10% exceed 15 ppb, a system must take action to control corrosion.

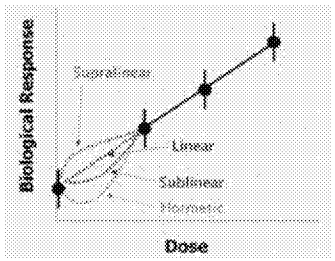
- Flint, MI
  - In 2014, the City of Flint changed its drinking water source without introducing control corrosion, elevating blood lead levels in children.
  - In March 2017, EPA awarded $100M to MI for Flint water infrastructure improvements.

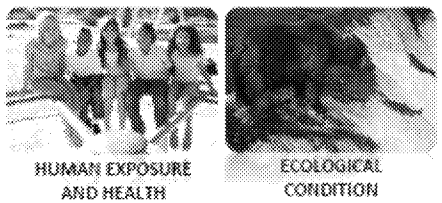
Report on the Environment

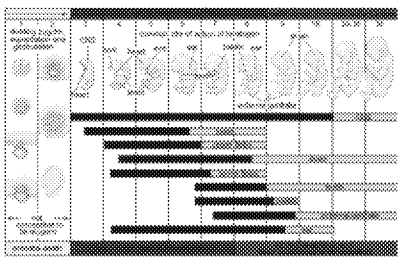
- Shows how the environment and human health in the United States is changing over time (2003 (draft), 2008, 2015)
- Presents the best available *lagging* indicators of national trends in air, water, land, human exposure and health, and ecological conditions
  - What are the trends in outdoor air quality and their effects on human health and the environment?
    - 24 indicators including NAAQS concentrations, emissions, acid deposition, ozone injury to plants, etc.
  - What are the trends in indoor air quality and their effects on human health?
    - 2 indicators: Homes at or above the EPA radon action level; serum cotinine
- http://cfpub.epa.gov/roe/index.cfm



Challenges and Opportunities



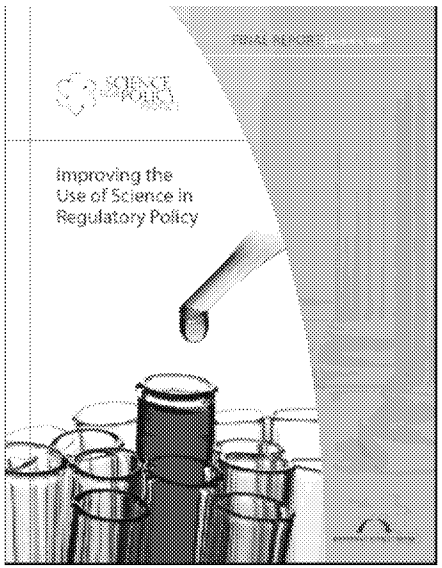




- Extrapolation from…
  - Occupational exposures to environmental exposures
  - Animal toxicology studies to human health effects
  - In vivo, in vitro, in silico toxicology to human health effects
- Harmonization of…
  - Cancer and non-cancer risks
  - Ecological and public health risks
- Chemical Mixtures and Cumulative Risk Assessment
  - Including non-chemical stressors
- Exposure Guidelines
  - Exposure is a function of concentration and time
  - Windows of susceptibility
- Uncertainty and Variability
- Leading vs. Lagging Indicators of Environmental Conditions
- Evolution of Genomics and Genome Engineering

Improving the Use of Science in Regulatory Policy

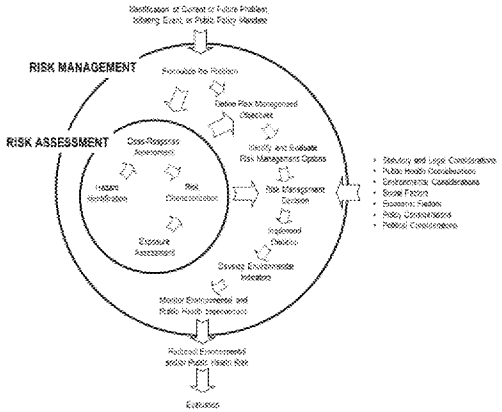
- The use of science in the formulation of regulatory policy – by both the Executive Branch and the Congress – has been a political flashpoint in recent decades.
- Policy makers often claim that particular regulatory decisions have been driven by, or even required by science; their critics, in turn, have attacked the quality or the interpretation of that science.
- Such conflict has left the U.S. with a system that is plagued by charges that science is being "politicized" and that regulation lacks a solid scientific basis.
- As a result, needed regulation may be stymied, dubious regulations may be adopted, issues can drag on without conclusion, and policy debate is degraded.
- Moreover, the morale of scientists is weakened, and public faith in both government and science is undermined.
- The question is not whether scientific results should be used in developing regulatory policy, but how they should be used.



Bipartisan Policy Center
August, 2009

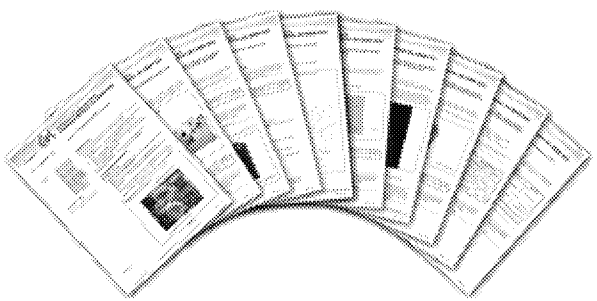
Recommendations to Improve the Use of Science in Regulatory Policy

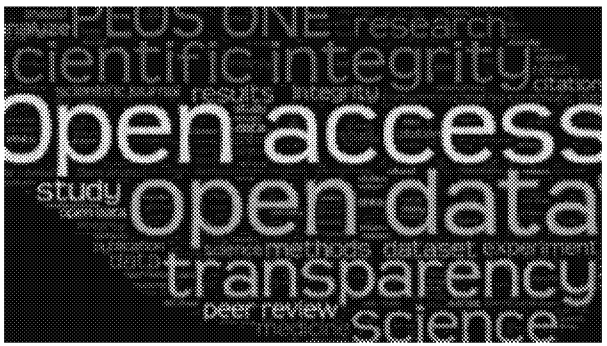
- The Administration needs to promulgate guidelines to ensure that when Federal agencies are developing regulatory policies, they explicitly differentiate, to the extent possible, between questions that involve scientific judgments and questions that involve judgments about economics, ethics, and other matters of policy.
- The Administration should promulgate guidelines on when to consult advisory panels on scientific questions, how to appoint them (including how to deal with conflicts of interest and biases), and how they should operate.



Recommendations to Improve the Use of Science in Regulatory Policy

- The Federal government, universities, scientific journals and scientists themselves can help improve the use of science in the regulatory process by strengthening peer review, setting and enforcing clear standards governing conflict of interest, and expanding the information available about scientific studies.





DISCUSSION

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